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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electric supply device in a welding robot, eliminates the unnecessary motion accompanying robot actuation of the power cable for passing a current to a welding torch etc. in detail, and it relates to the wiring structure of the electric supply cable for welding which could be made to shorten the equipment die length while it suppresses consumption of a power cable.

[0002]

[Description of the Prior Art] To the work piece which should be welded, continuously or intermittently, a welding robot does the variation rate of the welding torch etc., and performs welding which wants to a work piece. Therefore, it enables it to carry out a variation rate to the location which asks for the torch at the tip of a link mechanism object in three-dimensions space by carrying out crookedness actuation of each joint of the link object equipped with a torch suitably. Moreover, it moves freely in displacement space, or a link mechanism object is carried out [being carried in a revolving frame, etc. and] so that the displacement range can be changed greatly.

[0003] A robot is equipped with the cable for control for controlling the actuation, and the power cable for passing the current for welding when welding to a work piece. It is necessary to connect how many places of that between to the between to the controller which is a control device, and a robot body, and the base and the wearing part of a torch which supports a robot body, and each link after taking a motion of a joint into consideration is made to meet, or the former is made to build in and is wired.

[0004] Although, as for this control cable, that class and die length are fluctuated depending on the number of links, i.e., the number of joints, generally, those dimensions are miscellaneous and an a large number demand is carried out. They are thin originally, flexibility is high, and link built-in is possible for the most. Moreover, even when collecting and treating many control cables in the form of a flat cable, the deformans merit is benefited and a fitting can be carried out to a compact in many cases.

[0005] on the other hand, since it is alike occasionally, it carries out and a high current is passed, the power cable for passing the current for welding is in the inclination for a thick thing to be used. Therefore, as shown in drawing 8 , rather than it makes all link objects meet also until it can seldom expect the flexibility as a cable, but is arranged on the outside of a welding robot's lower arm or a revolving frame and it results in a torch Although 1-2 supporting points are prepared, after a power cable 31 comes out of the welding source (power supply box) 20, it is made into ***** in many cases outside the space which separated a few from each link being led even to the direct torch 18 etc.

[0006] When the time and a motion with few links of the robot 30 are small and the still larger space around a robot is left behind, in order for a cable to pull, and to prevent **** or to avoid the mixture with each link, those allowances curtain a little and it is given in the form of 32. It must stop however, fully having to consider the existence of deformation permission extent of a cable, or an interference object in a robot doing a complicated motion, doing the variation rate of the tool greatly, or moving at high speed etc.

[0007] Since such an outside ** cable bends at the movement toward right and left before and after a robot, or every rotation or it is extended, even if it gives sag, it is not avoided that the load of bending or hauling is applied to a cable. Moreover, from the relation by which a low-battery quantity current operation gestalt is taken, electric supply loss will increase, so that it becomes long.

[0008] When **** and a robot's operating range tend to be covered fully and it is going to supply electric power, in the semantics which reduces a load, it curtains and an amount must be given greatly increasingly. When it is large, if you make it crawl on the ground, that consumption becomes intense has given consideration of holding depending on the way of hanging whose accommodation is effective against a motion using the hanger stand 33 which it was not avoided, therefore was shown in drawing 8, in many cases.

[0009] On the other hand, displace at high speed, or if intense acceleration and deceleration are made, will follow a big deflection on company actuation of a cable, or a robot's engine performance is being improved every year, when there are no allowances in space, a circumference installation object is hit, or it rubs, and the covering is deleted or separates. If the repair is neglected, arcing will not occur in the midst of welding in an unexpected part, or fatal breaking down may also become started. Although it is because this also has the situation of not settling and going out even if a power cable wants to make it building in a revolving frame or a link by the reason it is thicker than a control cable etc. and rigidity is high, it cannot be overemphasized that this of outside ** becomes obstructive.

[0010]

[Problem(s) to be Solved by the Invention] Recently from such a situation, efforts not to make even the low power cable of flexibility into outside ** are being paid. In this case, it is at the maximum slack which serves as a neck in order to make into built-in structure whether to lessen sag, after eliminating, and the time between the revolving frames 1 and the robot bases 2 carrying the link mechanism object 19. This revolving frame is the part which rotates horizontally to the robot base and functions as the first shaft 34 of some shafts, and that actuation is just going to be required broadly.

[0011] It enables it to usually rotate a revolving frame **185 degrees. Although it is because actuation for which this covers 360 degrees or more and it asks anywhere is enabled as possible, if it is going to make electric supply possible over all these fields, the power cable in the revolving-frame neighborhood will be slacked, and an amount will become remarkable. It must stop for that purpose, a tooth space being not only needed, but having to put and introduce a device into a support device.

[0012] Even if it installs the above-mentioned hanger, the equipment for absorbing or letting out big sag is also required, and it becomes cost quantity, and time is taken also in a maintenance again. If the condition of receiving coming flying [of a spatter], or it being put to fume, and becoming easy to deteriorate is taken into consideration when allotted outside, a power cable will also become carrying out article-of-consumption treatment.

[0013] As an example which is going to solve some of problems which are not avoided on ** outside a power cable, there is a robot's wiring structure indicated by JP,8-155881,A. This arranges a guide tube along with a fixed pivot line with a perpendicular revolving frame, and lets a power cable pass in it. Die length excessive since that it is on a fixed pivot does not require the sag of many of a cable is eliminated, and can also control power loss.

[0014] However, in wiring which this axis is made to meet, revolution of a revolving frame will force a power cable a twist. If it is going to secure a twist **about 180 degrees, a bay must be secured in consideration of the twist rigidity of the cable, and the die length which can demonstrate, the twist permission section, i.e., the twist absorption function, of a there, must fully be given. Although a cable becomes short rather than it gives sag as a result, since a wiring location is decided uniquely, the degree of freedom on wiring is narrowed extremely.

[0015] And when reservation of long space will be obliged in the vertical direction and a robot's low level-ization is required, it is hard to respond to it. Moreover, at the both ends of the twist permission section which will fix a power cable, the force of a hoop direction concentrates on cable covering at every forward inverse rotation, a crack arises in covering, or adhesion with covering and lead wire falls to it, and it may also become the cause which brings degradation of a power cable forward.

[0016] Moreover, in order to permit forward-and-backward inclination with the second shaft made to rotate the link on a revolving frame, sag is surely required, but when it is going to make this possible, it is also necessary to sag a power cable in a guide tube. Therefore, the path of a guide tube is not made small, but the built-in to the revolving frame in which the motor for revolution and a reducer are carried is not easy, and also produces the said problem which causes enlargement of a revolving frame.

[0017] This invention is what was made in view of the above-mentioned problem. The purpose Wiring [/ near the revolving frame] can be packed into a compact that inner ** -ization of a power cable should be promoted, As an unnecessary load including the things or twist of giving sag to a cable is not done, the durability of a power cable is raised, It is offering the electric supply device of the welding robot which realized being able to change suitably the angle of traverse according to a motion of a revolving frame for which electric power's can be supplied, or enabling it to adjust.

[0018]

[Means for Solving the Problem] It connects with the welding tool with which the power cable for passing the current for welding equipped a welding robot's point, and this invention is applied to the welding robot with which the revolving frame in which the link mechanism object for carrying out the variation rate of the welding tool was carried is supported possible [revolution] to the robot base. The place by which it is characterized [the], while the electric supply ring 8 is attached in either one side of a revolving frame 1 and the robot base 2 with reference to drawing 1 , the electric supply brush 9 energized in slide contact with the electric supply ring is attached in the other side. And it is having enabled it to pass the welding current to the welding tool 18 (to see drawing 4) through the electric supply ring 8 and the electric supply brush 9, without each of power-cable 3B connected to power-cable 3A and the electric supply brush 9 which were connected to the electric supply ring 8 producing a motion in the connection places 8a and 9a, even if the revolving frame 1 receives the robot base 2 and circles towards a gap.

[0019] The electric supply ring 8 is attached in the upper limb outside periphery of the robot base 2, it is fixed to a revolving frame 1 and the electric supply brush 9 should just make this **** on the external surface of the electric supply ring 8. In addition, the electric supply ring 8 is attached in the margo-inferior section periphery of a revolving frame 1, and it is fixed to the robot base 2 and you may make it make the electric supply brush 9 **** on the external surface of the electric supply ring 8, as shown in (c) of drawing 7 .

[0020] The electric supply ring 8 may be the perfect ring object of 360 degrees, and as shown in (a) of drawing 5 , it may be imperfect ring object 8A of less than 360 degrees. If you enable it to fix the imperfect ring object 8A to a hoop direction possible [a location substitute], it is convenient.

[0021] The electric supply ring 8 can also use circular segment 8s as the poor segment combination object about the same as plurality, as shown in drawing 6 . The segment combination object can also enable it to have electric conduction segment 8Y and insulating segment 8Z. Anyway, in order to form the spring 10 shown in the electric supply brush 9 which ****s to the electric supply ring at drawing 2 and to make it stick to the electric supply ring 8, it is desirable to make it demonstrate the energization force from behind.

[0022]

[Embodiment of the Invention] Below, the electric supply device of the welding robot concerning this invention is explained at a detail based on the gestalt of the operation. Drawing 1 shows the structure where the revolving frame 1 in which the link mechanism object for carrying out the variation rate of the welding tools, such as a welding torch, was carried is supported possible [revolution] to the robot base 2. Inner ***** of the power cable 3 which passes the current for welding which is not illustrated to a welding torch is preponderantly expressed to especially this.

[0023] In addition to the power cable, many control cables 4 are also arranged inside, but they are made to crawl on the inside of a coil 5, after making it flat-cable-ize. The coil is running along the inside of the robot base 2, a revolving frame 1, and the link mechanism object that is not illustrated, and it is controlled based on the signal with which the motion of a motor which drives the shaft of each joint is transmitted in the control cable, and the motion is detected, and it is sent out to the controller as a

control unit.

[0024] Although it can circle **180 degrees or more than it to the robot base 2, the 1st shaft of the robot which functions as the fixed pivot has led to the motor 6 and reducer 7 which drive it, it avoids the core of a revolving frame 1 or the robot base 2, and a coil 5 is made, as for a revolving frame 1, to crawl on it. In this invention, it is considered that the space of the perimeter which surrounds a motor etc. should be used in view of the ability not to also allot a power cable 3 to the core.

[0025] Therefore, the electric supply ring 8 is attached in either one side of a revolving frame 1 and the robot base 2, and the electric supply brush 9 energized in slide contact with the electric supply ring is attached in the other side. Although a power cable will be divided in this part to two, power-cable 3A by the side of a power supply box, and power-cable 3B by the side of a link, while connection is maintained electrically, a motion of the fragmentation edge of each power cable can be eliminated completely.

[0026] Since a revolving frame 1 is supported by the top face of the robot base 2, both mating face makes the shape of a ring in principle. Therefore, the electric supply ring 8 can be attached in the upper limb outside periphery of the robot base 2, and he fixes to a revolving-frame 1 side, and is trying to make the electric supply brush 9 specifically **** on the external surface of the electric supply ring 8 to this.

[0027] It can be made to circle in the electric supply ring 8 in the range in which control cable 4 grade's deformation of a revolving frame 1 is permitted, if it is made into the perfect ring object of 360 degrees, without being restrained by electric supply structure. In addition, since the electric supply ring 8 is stuck to the electric supply brush 9, the spring 10 energized from behind is formed. The situation can be clearly grasped also in drawing 2. Even if an electric supply brush wears out a little, both slide contact condition becomes what was always stabilized, and structure of being equal also to long-term operation is realized by this.

[0028] Thus, if it sets, even if a revolving frame 1 circles to the robot base 2, each of power-cable 3B connected to power-cable 3A and the electric supply brush 9 which were connected to the electric supply ring 8 can pass the welding current to a welding torch through the electric supply ring 8 and the electric supply brush 9, without producing a motion in the connection places 8a and 9a.

[0029] When it states a little in more detail, the electric supply ring 8 is for example, a formal copper pressed part which covers the upper limb of the robot base 2, as shown in drawing 1. If it is made to consist of flat section 8F by which extraction was carried out, and short cylinder part 8C which hung from the periphery, the electric supply ring 8 can perform contact to the electric supply brush 9 by cylinder part 8C, and can fix flat section 8F to the top face of the robot base 2 on a screw 11 etc.

[0030] In the example of drawing 1, the connector 12 for energization is formed in a part of inner circumference edge of flat section 8F, and it connects with power-cable 3A which has come out of the power supply box which this does not illustrate. In addition, since a high current low battery is generally built over the electric supply ring 8, an insulating ring 13 is arranged on the bottom of an electric supply ring, and consideration of short circuit prevention is made to robot base 2 the very thing so that a current may not flow.

[0031] Although it is supported by the top face of the robot base 2 and circles, a revolving frame 1 does not go to the reason for carrying directly on the electric supply ring 8, but he is trying to operate it also as a slide shoe on the other hand, while putting the insulating board 14 on the flat section 8F and achieving the electric insulation to a revolving frame 1. Therefore, if it considers as the insulating board, the ingredient of a hard nylon system is adopted.

[0032] The electric supply brush 9 is attached in a way through metallic ornaments 15 at a revolving frame 1 outside the slide contact side for revolution. As for the electric supply brush 9, the thing made from carbon is adopted. Power-cable 3B is also connected with metallic ornaments 15, it is protected with a coil 16, and a revolving frame 1 is ****(ed). Although deflection is needed in the joint part between the first link 17, it can be made to fully correspond by the sag of extent given within a coil 16.

[0033] By such configuration, a current should pass power-cable 3A, the electric supply ring 8, the electric supply brush 9, and power-cable 3B, and a motion of the power cables 3A and 3B in the part of the first shaft with the largest motion is lost entirely. The electric supply brush 9 energized in the

direction of the electric supply ring 8 with the spring 10 the peripheral face of cylinder part 8C of the electric supply ring 8, and always maintains contact.

[0034] As shown in right drawing, even if the electric supply brush 9 changes a location from left drawing with revolution actuation of the revolving frame 1 of drawing 3, the energization condition is maintained. Moreover, even if the link mechanism object 19 operates so that a welding torch 18 may be pulled back from the most distant location to this side as shown below from on drawing 4, power-cable 3A from the robot base 2 to a power supply box 20 maintains quiescence, and the fixed side of the electric supply brush 9 of power-cable 3B does not move, either. Therefore, the ground can be made to crawl on power-cable 3A, as shown in drawing. In addition, the sign 21 in drawing is a welding wire which lets out from a reel 23 and is fed by the welding torch 18 with wire feeding equipment 22.

[0035] A hanger stand 33 like drawing 8 is not required, and mixture of the power cable between a robot and a power supply box is eliminated, and becomes what also felt appearance refreshed so that it may understand from now on. Inner *-ization (interior-izing) of a power cable is attained, and wiring near the revolving frame is extremely collected into a compact. Neither sag nor a twist takes place to a power cable, and the durability of the power cable over a long period of time is realized.

[0036] It can also become possible to arrange many work pieces to one robot's perimeter, and to make it carry out sequential welding, or to change a work piece to it between the welding, and it can be made to greatly contribute to the improvement in efficiency of welding operation, as a result of securing greatly the range to a revolving frame for which electric power can be supplied.

[0037] Incidentally, an electric supply ring can also be set to imperfect ring object of 270 degrees 8A as shown in (a) of less than 360 degrees, for example, drawing 5. In this case, since supply of the welding current will be permitted only in that range that can be energized, even if a robot circles superfluously, when an electric supply brush puts to the part where the electric supply ring broke off and cuts, the flow of the welding current stops at least, the flow of the welding current to the robot suitable for an unnecessary field is obstructed, and high safety is secured.

[0038] If this imperfect ring object 8A is made to meet the wearing slot 24, can be shifted to a hoop direction and fixed possible [a location substitute], it can be made to correspond simply also to modification of operating range. Although the power cable (not shown) connected with a power supply box will be moved when it changes an unnecessary region, it is not necessary to say that it does not move during operation of a robot.

[0039] Drawing 6 is the example which constituted the electric supply ring 8 from a segment combination object which put circular segment 8s plurality in order. A copper segment panel is stuck on the wearing slot 24 of the robot base 2 on the stop screw 25. In addition, if it is made the both-ends overlap type as shown in (b) of drawing 5, it will become easy to suppress generating of the trouble over the electric supply brush in a connector part segment 8s.

[0040] In this case, the electric supply ring 8 formed can also use to make the perfect ring object of 360 degrees constitute as the imperfect ring object of less than 360 degrees, as (a) of drawing 5 described. In consideration of the activity range, energization becomes possible only in the required range. When it circles until a robot becomes the unexpected sense, a having already stated passage can intercept the welding current.

[0041] If it considers as such a segment combination object method, the attachment location can be changed beforehand, corresponding to the installation location or work environment of a work piece with a natural thing. that is, control software be involved in the measure by a robot's electric safety aspect if an imperfect ring object can fix now to the hoop direction of the robot base 2 possible [a location substitute] -- the operation which could carry out ** etc., and could give versatility, therefore had flexibility can be made to perform to a robot now

[0042] In addition, if it is made to constitute from electric conduction segment 8Y and insulating segment 8Z which show a segment combination object to drawing 6, while an electric supply brush ****s to an insulating segment, the welding current can be intercepted, a welding operator can use this a top or the welding source emergency trips at the time of an overrun can be presented with it.

[0043] Drawing 7 is a schematic diagram showing the example made [example] reverse each

attachment of the electric supply ring 8 and the electric supply brush 9 between a revolving frame 1 and the robot base 2, or it was made to make the electric supply brush 9 **** to the inner skin of the electric supply ring 8. (a)-izing [drawing 1 / **/ type] and remains as it is, and (b) is the inner circumference slide contact mold. The electric supply ring 8 was attached in the margo-inferior section periphery of a revolving frame 1, the electric supply brush 9 was fixed to the robot base 2, and (c) is in slide contact with the external surface of the electric supply ring 8. The electric supply ring 8 carries out [(d)] the inner circumference slide contact of the electric supply brush 9.

[0044] any [to power cables 3A and 3B / anyway, / a power cable / a power cable is divided by the thing of 3A and 3B of a sign, makes the meantime energize with the electric supply ring 8 and the electric supply brush 9, and] -- ***** -- ***** occurs. Of course, it becomes what has convenience good [even if it gives sag to the power-cable 3B side, it is small and good, and] also when promoting a miniaturization and low-level-izing of a robot.

[0045] In the case of an inside slide contact mold, exposure of an electric supply ring is avoided and it is very convenient in a safety aspect, but difficulty hangs around the maintenance of the electric supply brush within the narrow robot base 2 or a revolving frame 1 a little. On the other hand, in the case of an outside slide contact mold, consideration of forming the protection shielding 26 (seeing a [of drawing 7 / (a)] and the (c)) is needed, but the maintenance nature of the electric supply brush 9 has the advantage which becomes very good.

[0046] If this invention is the welding robot with which the power cable which passes the welding current was adopted, it can be applied, and can be used in various kinds of arc welding so that the above explanation may show. Of course, it cannot be overemphasized that this kind of thought is a thing employable if needed also in the cable of not only a power cable but others in a part with actuation, such as rotation and revolution.

[0047]

[Effect of the Invention] The welding current can be passed to a welding tool, without each of the power cable connected to the power cable and electric supply brush which were connected to the electric supply ring producing any motion in the connection place, even if a revolving frame circles to the robot base since an electric supply brush is attached in another side for an electric supply ring and it was made to make it **** to either one side of a revolving frame and the robot base according to this invention.

[0048] Therefore, to the power cable is thick and deformation is not easy a power cable, sag is given, or forcing it a twist decreases, and while consumption of a power cable is suppressed as much as possible, simplification from improvement in durability or the field of a maintenance service is attained. The equipment which supports a power cable in perimeter space is also less necessary, appearance also improves and miniaturization of wiring is promoted. Being able to prepare an extensive electric supply attitude according to the angle of traverse of a revolving frame, also to a quick motion of a robot, it corresponds smoothly, and an electric supply ring and an electric supply brush become, without it seeming that a power cable regulates it.

[0049] If an electric supply ring is fixed to the upper limb outside periphery of the robot base, an electric supply brush is fixed to a revolving frame and it is made to make an electric supply brush **** on the external surface of an electric supply ring, an electric supply device can be infixed in the narrow tooth space between a revolving frame and the robot base, and a possibility of causing enlargement of a robot will also be lost. Even if reverse in the attachment structure, the same effectiveness can be done so, and the flexibility on a design is also raised.

[0050] The electric supply ring is not used as the perfect ring object of 360 degrees, or what is also considered as the imperfect ring object of less than 360 degrees does not interfere. Even if a revolving frame is in which direction in the case of the former, an electric supply attitude is maintainable. In the case of the latter, when it is in the inconvenient direction, as the welding current does not flow beforehand, generating of the unexpected situation can be lessened as much as possible.

[0051] If it enables it to fix an imperfect ring object to a hoop direction possible [a location substitute], only the electric supply to the location according to a work piece or work environment will be permitted. Change suitably the angle of traverse according to a motion of a revolving frame for which electric

power can be supplied, or can adjust, the opportunity of generating of the unnecessary trouble by a robot's overrun etc. is reduced, or making it correspond promptly to proper timing is realized.

[0052] If it is made the configuration equipped with an electric conduction segment and an insulating segment when using an electric supply ring as a segment combination object, the edfety doubled with the work environment of each time can be made to reflect flexibly, and it will become possible to make it cope with it very effectively also to an emergency shut down etc.

[0053] If the spring energized from the brush back is prepared in order to stick an electric supply brush to an electric supply ring, causing poor energization will be lost. Moreover, the welding actuation by which both adhesion was maintained and the electric supply brush was stabilized as the decrease of grinding comes to be attained over a long period of time.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Structural drawing showing the electric supply device of the welding robot concerning this invention of the revolving-frame lower part.

[Drawing 2] The II-II line view Fig. in drawing 1 .

[Drawing 3] The bird's-eye view explaining migration of an electric supply brush when a revolving frame circles.

[Drawing 4] A series of operating status explanatory views of a welding robot.

[Drawing 5] For (a), (b) is the example of attachment of the electric supply ring used as the imperfect ring object, and a sectional view explaining an example of connection of a circular segment.

[Drawing 6] The wearing explanatory view in the case of making an electric supply ring form by the circular segment.

[Drawing 7] The schematic diagram showing the modification in the case of attaching an electric supply ring and an electric supply brush in a revolving frame or the robot base.

[Drawing 8] The Fig. explaining a motion of the robot at the time of allotting a power cable outside of operation.

[Description of Notations]

1 [-- An imperfect ring object 8Y / -- An electric conduction segment, 8Z / -- An insulating segment, 8a / -- A connection place, 8s / -- A segment, 9 / -- An electric supply brush, 9a / -- A connection place, 10 / -- A spring, 18 / -- A welding tool (welding torch), 19 / -- A link mechanism object, 20 / -- A power supply box, 25 / -- Stop screw.] -- A revolving frame, 2 -- robot base, 3, 3A, 3B -- A power cable, 8 -- An electric supply ring, 8A

[Translation done.]

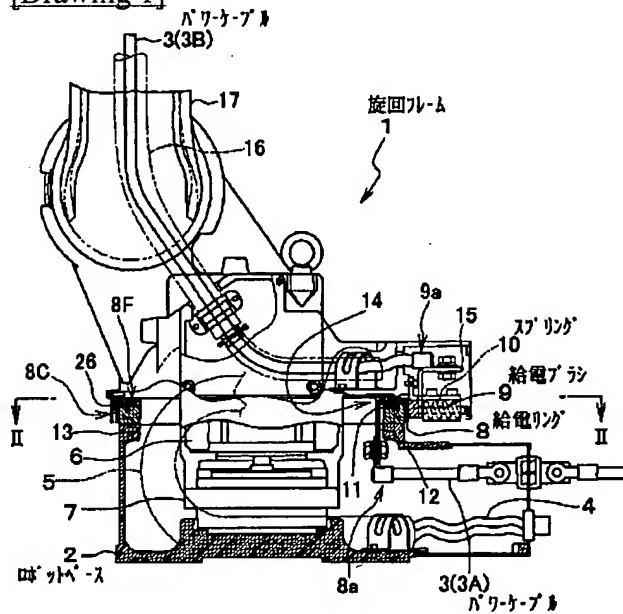
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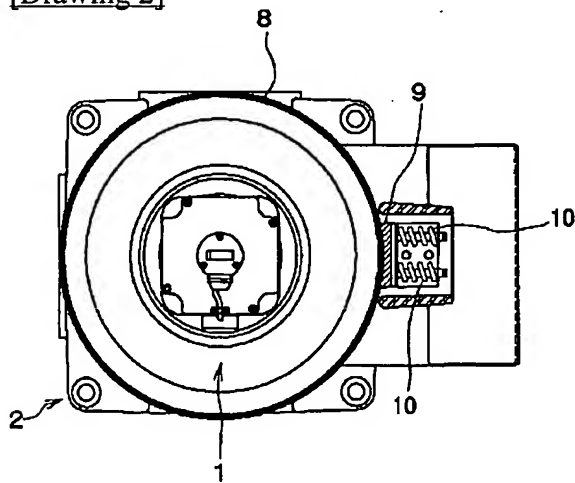
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DRAWINGS

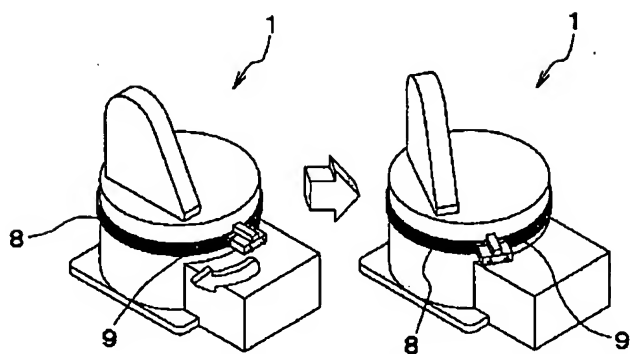
[Drawing 1]



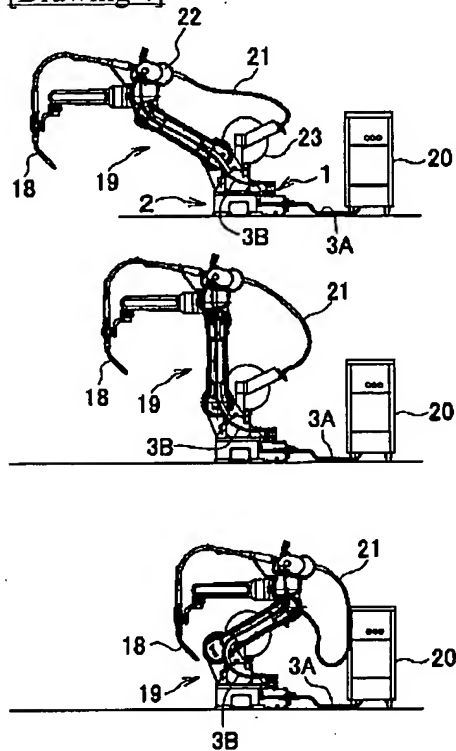
[Drawing 2]



[Drawing 3]

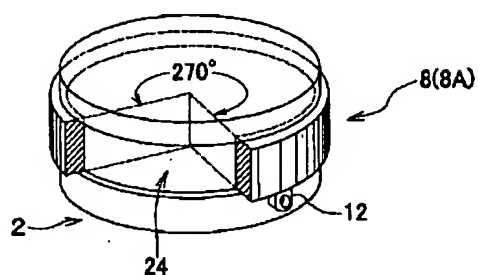


[Drawing 4]

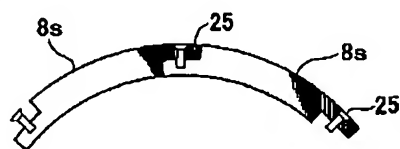


[Drawing 5]

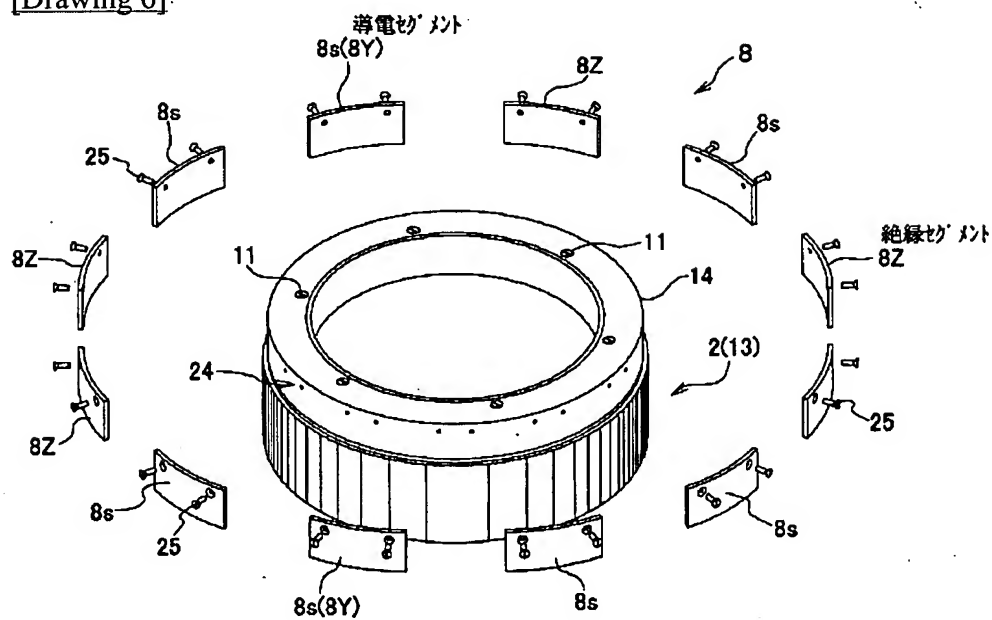
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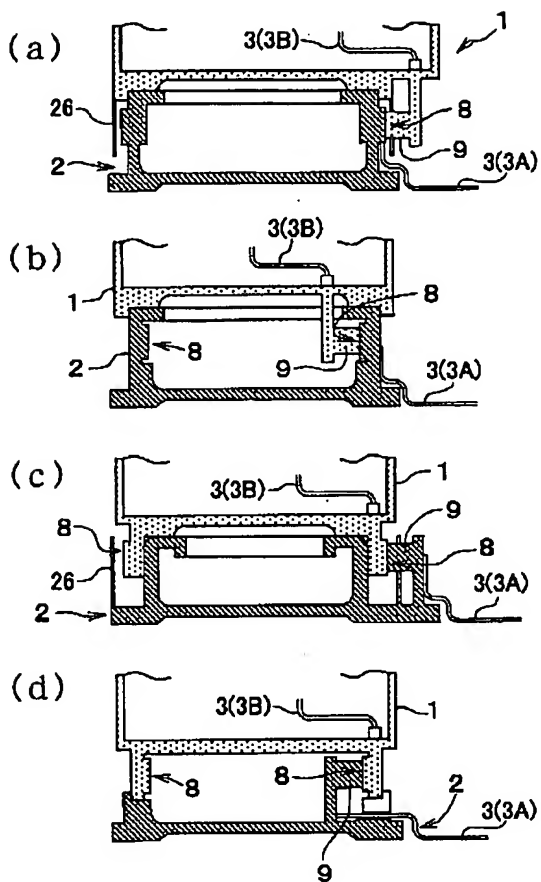
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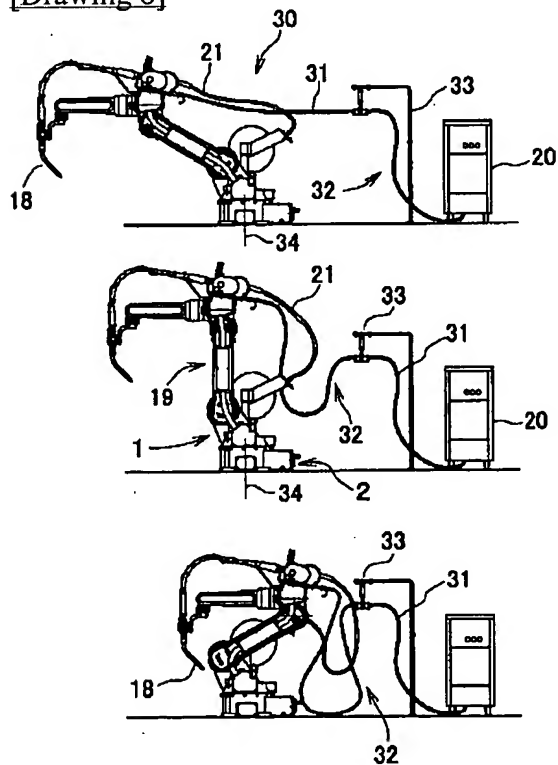
[Drawing 6].



[Drawing 7]



[Drawing 8]



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CLAIMS

[Claim(s)]

[Claim 1] It connects with the welding tool with which the power cable for passing the current for welding equipped a welding robot's point. In the welding robot with which the revolving frame in which the link mechanism object for carrying out the variation rate of this welding tool was carried is supported possible [revolution] to the robot base While an electric supply ring is attached in one side of said revolving frames and robot bases Even if the electric supply brush energized in slide contact with this electric supply ring is attached in the other side and said revolving frame circles to the robot base Without each of the power cable connected to the power cable and electric supply brush which were connected to said electric supply ring producing a motion in the connection place The electric supply device of the welding robot characterized by enabling it to pass the welding current to said welding tool through the above-mentioned electric supply ring and an electric supply brush.

[Claim 2] It is a welding robot's electric supply device indicated by claim 1 characterized by having attached said electric supply ring in the upper limb outside periphery of said robot base, having fixed said electric supply brush to the revolving frame, and being in slide contact with the external surface of said electric supply ring.

[Claim 3] It is a welding robot's electric supply device indicated by claim 1 characterized by having attached said electric supply ring in the margo-inferior section periphery of said revolving frame, having fixed said electric supply brush to the robot base, and being in slide contact with the external surface of said electric supply ring.

[Claim 4] Said electric supply ring is a welding robot's electric supply device indicated by any 1 term of claim 1 characterized by 360 being a perfect ring object thru/or claim 3.

[Claim 5] Said electric supply ring is a welding robot's electric supply device indicated by any 1 term of claim 1 characterized by being the imperfect ring object of less than 360 degrees thru/or claim 3.

[Claim 6] Said imperfect ring object is a welding robot's electric supply device indicated by claim 5 characterized by being fixed to a hoop direction possible [a location substitute].

[Claim 7] Said electric supply ring is a welding robot's electric supply device indicated by any 1 term of claim 1 characterized by being a poor segment combination object about the same as plurality about a circular segment thru/or claim 6.

[Claim 8] Said segment combination object is a welding robot's electric supply device indicated by claim 7 characterized by having the electric conduction segment and the insulating segment.

[Claim 9] A welding robot's electric supply device indicated by any 1 term of claim 1 characterized by preparing the spring energized from behind since said electric supply ring is stuck to said electric supply brush thru/or claim 8.

[Translation done.]